

1. **Title:** EE260: Bioimaging and Systems Biology
2. **Prerequisite:** Consent of instructor
3. **Instructor:** Bahram Parvin
4. **Time and Location:** Friday, 2-5pm, Humanities and Social Sciences, Rm 1407
5. **Units:** 4
6. **Description:** The course introduces computational bioimaging within the context of Systems Biology. Instructor will provide a review of molecular and cell biology for Graduate students majoring in Engineering and Computer Science and proceed with issues and techniques in computational bioimaging and bioinformatics systems.
7. **Course outline:**
  - *Week one:* review of cell and molecular biology for Engineers/Computer scientists and overview of the course projects
  - *Week two:* review of microscopy techniques and production of expression data
  - *Week three:* Introduction to variational calculus and differential geometry
  - *Week four:* Introduction to variational approach for segmentation and shape analysis
  - *Week five:* Level set methods for morphological analysis
  - *Week six:* Spatial voting techniques for morphological and protein localization
  - *Week seven:* Learning methods for shape representation and the analysis of gene expression data
  - *Week eight:* Analysis of microarray data and pathway inference
  - *Week nine:* Experimental design, high throughput screening informatics systems, and project presentation by students
  - *Week ten:* Large scale imaging bioinformatics systems and project presentation by students
  - *Week eleven:* Project presentation
8. **References:** Instructor will provide papers and handouts. Other references are:
  - Sethian, J. "Level Set Methods and Fast Marching Methods: Evolving Interfaces in Computational Geometry, Fluid Mechanics, Computer Vision, and Materials Science," Cambridge University Press, 1999.
  - Andres Kriete (edited), "Systems Biology," Elsevier, 2005, In press.
  - Bruce Alberts, et al, "Molecular Biology of the Cell," 4th edition, Garland Publitioning, Inc.
  - **Grading:** project presentation
  - **Quarter:** Fall 2006